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FLUOR

November 15, 2001

FH-0105384

Ms. J. H. Kessner, Program Manager
Analytical Services
Bechtel Hanford
3190 George Washington Way H9-03
Richland, Washington 99352

Dear Ms. Kessner:

FINAL RESULTS FOR THE 233S L-16 VESSEL PIPE AND L-6 VESSEL SLUDGE SAMPLES—SDG S0031 AND S0032

References: (1) Letter, A. S. Chaloupka, BHI, to E. F. Mares, FH, "Letter of Instruction for the 233S Plutonium Concentration Facility Sample Analysis," 084911, dated December 20, 2000.
(2) HNF-SD-CD-QAPP-016, Rev. 5, "222-S Laboratory Quality Assurance Plan," dated April 2, 2001.

This letter and attachments present the final results for the L-16 vessel pipe (B124H1 and B124H1-A) and the L-6 vessel sludge (B124H2) samples received at the 222-S Laboratory from the 233S Plutonium Concentration Facility process areas on May 30, 2001. The samples were analyzed for those analytes indicated on the attached copy of the chain of custody form in accordance with the *Letter of Instruction for the Plutonium Concentration Facility Sample Analysis* referenced above.

If you have any questions regarding this report, please feel free to call me on 373-4314.

Sincerely,

Ruth A Bushaw

Ruth A. Bushaw, Project Coordinator
222-S Production Control Support

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Attachments (7)

FH-0105384

ATTACHMENT 1

FINAL RESULTS FOR THE 223S L-16 VESSEL PIPE AND L-6 VESSEL SLUDGE SAMPLES-SDG S0031 AND S0032

Consisting of 6 pages
Including cover page

Attachment 1
Narrative

FINAL RESULTS FOR THE 233S L-16 VESSEL PIPE AND L-6 VESSEL SLUDGE SAMPLES – SDG S0031 AND S0032

One pipe sample (B124H1/B124H-1A, SDG S0031) and one sludge sample (B124H2, SDG S0032) from the 233S Plutonium Concentration Facility were received at the 222-S Laboratory on May 30, 2001. The samples were analyzed for those analytes indicated on the attached copies of the chain of custody (COC) forms in accordance with the *Letter of Instruction for the 233S Plutonium Concentration Facility* (LOI), referenced in the cover letter.

A Data Summary Report is included as Attachment 2. The correlation between customer sample identification numbers and laboratory identification numbers are presented in the sample breakdown diagrams included as Attachment 3. Copies of the chain of custody and Request for Sample Analysis forms are included as Attachment 4. Correspondences concerning analysis variances that were accepted by the 233-S Project personnel are included in Attachment 5.

On June 18, 2001, a request was received by electronic mail (included in Attachment 5) to analyze the exterior of the pipe sample (B124H1-A) for polychlorinated biphenyls (PCB). Another electronic mail message, received on August 9, 2001, indicated that the distribution of PCBs on the exterior of the pipe would be associated with the paint/fixative. Therefore, only the paint/fixative was analyzed for PCB. The SW-846 holding time of 14 days to extract the samples for the PCB analysis was missed because of the 18-day delay between the sampling date and the request for the analysis. No PCBs greater than 50 ppm were detected in the sample. The analysis results are included in the Data Summary Report.

In October 2001, the 222-S Laboratory reported that there was a potential discrepancy in the actual volume of acid present in vials that were used for making 10-mL dilutions of samples for certain radionuclide analyses. A reanalysis was performed only for those samples/tests that were potentially affected by this discrepancy. This reanalysis time delayed issuance of this letter report. Only the reanalysis results are included in the Data Summary report.

Table 1 lists the samples with results that are different from those previously reported in Interim Results Reports.

Table 1. SDG S0031 and S0032 Results that Changed Since Interim Results Released

Sample ID	Additional Results
SDG S0031	
B124H1 1st Etch of pipe interior (S01M000258 – new sample S01M000332)	^{238}Pu, $^{239/240}Pu$, ^{241}Am and $^{243/244}Cm$
B124H1-A 1st Etch of pipe exterior (S01M000223 – new sample S01M000332)	^{238}Pu, $^{239/240}Pu$, ^{241}Am and $^{243/244}Cm$
B124H1-A paint/fixative (S01M00252)	Total alpha/Total beta ^{238}Pu, $^{239/240}Pu$, ^{241}Am and $^{243/244}Cm$
SDG S0032	
B124H2 L-6 Vessel Solid (S01M000218)	Total alpha/Total beta

Sample Appearance and Handling

SDG S0031 – This sample delivery group consists of customer sample numbers B124H1 and B124H1-A. These numbers were associated with the interior (B124H1) and exterior (B124H1-A) of a piece of pipe from the L-16 vessel. Length and diameter measurements were made with a ruler. The length was measured in inches (in.) and the inside and outside diameters in centimeters (cm.). The measurements assume uniform thickness and squarely cut ends and should be considered estimates. The length is approximately 9 ¾ inches (24.8 cm). The outside diameter is approximately 6.4 cm and the inside diameter is approximately 5.0 cm.

The pipe was too heavy to weigh on the available balance. The weight was estimated to be 5 ¼ to 5 ½ pounds, based on the measured dimensions and the densities of typical steels. Attachment 6 contains a worksheet with these calculations.

The subsamples for analysis of the interior and exterior of the pipe were obtained in accordance with the test procedure included as Attachment 7. For the interior of the pipe, only about 8 ¼ inches of the interior was exposed to the etching solution because the rubber stopper plugs covered approximately ¾ in. at each end. For the etching of the exterior, the paint/fixative was removed from about 2.2 in. of the pipe and only this portion was exposed to the etching solution. The reported results reflect the total µg or µCi of analyte removed from these exposed sections of the pipe.

SDG S0032 – This sample delivery group consists of customer sample number B124H2, L-6 vessel solid. This sample is a brown dry solid that had some powdery material and some flakes about ¼ inch in diameter. The sample was not blended, but a representative mixture of the powder and flakes was used for the sample digest.

Analytical Results

Holding Times

As stated previously, the SW-846 holding time of 14 days to extract the samples for the PCB analysis was missed because of the 18-day delay between the sampling date and the request for the analysis. The PCB analysis was performed within the holding time between extraction and analysis.

The SW-846 holding time of 6 months for total alpha analysis was met. There were no other applicable holding times for the analysis of these samples.

General Analysis Results Discussion

For the analysis of the pipe, both specific alpha (plutonium, americium and neptunium) and gross (total) alpha analyses were requested. The gross alpha results were about 71% to 88% of the sum of the individual alpha emitters. This is typically caused by traces of solids on the alpha sample mounts causing self-absorption. These are the best results that can be obtained based on the nature of the solutions analyzed.

Comparison of plutonium and neptunium results between radiochemical methods and inductively coupled plasma/mass spectrometry (ICP/MS) showed very good agreement.

Quality Control Results

Laboratory Control Standards

All laboratory control standard (LCS) recoveries were acceptable in accordance with the 222-S Laboratory Quality Assurance Plan (QAPP-016), referenced in the cover letter, except for the Aroclor 1254 LCS for the PCB analysis. The recovery of this standard (134%) was slightly higher than the limits of 70% - 130% typically considered as acceptable. Since a high LCS recovery might indicate that results are biased, and the sample results were less than the TSCA regulatory limits, no reanalysis was requested.

Matrix Spikes/Matrix Spike Duplicates/Sample Duplicates

Per the LOI, no matrix spikes, matrix spike duplicate or duplicate samples were required.

Preparation Blanks

Low levels of alpha contamination were detected in all of the method and preparation blanks. Low levels of beta contamination were detected in the acid digest and fusion digest preparation blanks associated with the analysis of the paint/fixative from the exterior of the pipe (B124H1-A) and the L-6 vessel solid sample (B124H2). In all cases, the level of contamination represented, at most, 2% of the activity reported for the associated samples and was considered insignificant in accordance with QAPP-016. No reanalysis was requested.

Practical Quantitation Limits (PQL)

For the analysis of the pipe (B124H1 and B124H1-A), the interior and exterior surfaces were etched with acid and the results were reported on a "per sample" basis. No customer requested practical quantitation limits (PQLs) were given on a "per sample" basis. The only analyses with applicable PQLs were the paint/fixative from the pipe exterior (B124H1-A) and the L-6 vessel solid (B124H2), which were reported on a "per gram" basis. For those analytes reported as non-detected for these two samples, PQLs or detection limits (DL) were not met for the following analytes.

For gamma energy analysis (GEA), cobalt-60, cesium-137, europium-152, europium-154, europium-155 and radium-226 had detection limits reported above the requested PQLs. This was due to the small sample size, driven by the amounts of americium and plutonium in the samples.

The PQL for curium-243/244 by alpha energy analysis (AEA) was not met because of the dilution required to reduce the activity of americium-241 in the samples.

For ICP/MS, PQLs were not met for uranium-234 and uranium-235 because of the dilution required to reduce the concentration of uranium-238 in the sample.

Surrogate Recoveries

The recoveries for the surrogates (tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB)) were within the allowed recovery limits of 50% - 150%. The recoveries ranged from 54.4 % to 56.4% for the TCX and from 73.3% to 88.8% for the DCB.

Analytical Procedures

Table 2 presents the 222-S Laboratory analytical procedures used to generate the reported results.

Table 2. Analytical Procedures

[redacted]	[redacted]	[redacted]
[redacted]		
ICP/MS (actinides)	Direct for Etching Solution Fusion for Paint/Fixative	LA-506-101 Rev A-4
[redacted]		
AT/TB	Direct for Etching Solution Fusion for Paint/Fixative Acid Digest for Solid	LA-508-101 Rev. G-2
^{241}Am $^{243/244}Cm$	Direct for Etching Solution Fusion for Paint/Fixative	LA-953-104 Rev B-4
^{238}Pu & $^{239/240}Pu$	Direct for Etching Solution Fusion for Paint/Fixative	LA-953-104 Rev B-4
^{237}Np	Direct for Etching Solution Fusion for Paint/Fixative	LA-933-141 Rev H-5
GEA	Direct for Etching Solution Fusion for Paint/Fixative Acid Digest for Solid	LA-548-121 Rev F-2
[redacted]		
PCB	LA-523-138 Rev. C-0	LA-523-140 Rev. A-0

Acid digest procedure – LA-505-163 Rev. C-0
Fusion digest procedure – LA-549-141 Rev. G-3
Abbreviations
ICP/MS – ICP/mass spectrometry
AT/TB – total alpha/total beta
Np – neptunium
GEA – gamma energy analysis
Am – americium
Cm - curium
Pu – plutonium
PCB – polychlorinated biphenyls

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ATTACHMENT 2

DATA SUMMARY REPORT

Consisting of 5 pages
Including cover page

Attachment 2. Data Summary Report
233S SDG11

CUSTOMER SDG #: S0031
CUSTOMER SAMPLE ID: B124H1

SAMPLE PORTION: 1st Etch Pipe Interior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000258			Np237 by TTA Extraction	uCi/Sample	87.4	<0.0902	<40.6	n/a	n/a	n/a	n/a	43	1.3e+02
S01M000258			Cobalt-60 by GEA	uCi/Sample	109	<2.79e-05	<2.81e-04	n/a	n/a	n/a	n/a	2.8e-04	n/a
S01M000258			Cesium-137 by GEA	uCi/Sample	112	<3.33e-05	<3.83e-04	n/a	n/a	n/a	n/a	3.8e-04	n/a
S01M000258			Europium-152 by GEA	uCi/Sample	n/a	<5.75e-05	<9.43e-04	n/a	n/a	n/a	n/a	9.4e-04	n/a
S01M000258			Europium-154 by GEA	uCi/Sample	n/a	<8.65e-05	<1.07e-03	n/a	n/a	n/a	n/a	1.1e-03	n/a
S01M000258			Europium-155 by GEA	uCi/Sample	n/a	<4.38e-05	<1.47e-03	n/a	n/a	n/a	n/a	1.5e-03	n/a
S01M000258			Radium-226 by GEA	uCi/Sample	n/a	<5.49e-04	<7.47e-03	n/a	n/a	n/a	n/a	7.5e-03	n/a
S01M000258			Americium-241 by GEA	uCi/Sample	n/a	<3.88e-05	1.17e+05	n/a	n/a	n/a	n/a	n/a	0.080
S01M000258			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	2.20e+05	n/a	n/a	n/a	n/a	26	0.80
S01M000258			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	2.31e+04	n/a	n/a	n/a	n/a	2.3e+02	2.1
S01M000332			Pu-239/240 by TRU-SPEC Resin	uCi/Sample	103	<5.52e+03	1.15e+05	n/a	n/a	n/a	n/a	1.0e+04	2.0
S01M000332			Pu-238 by TRU-SPEC Resin IonEx	uCi/Sample	n/a	<5.52e+03	2.81e+04	n/a	n/a	n/a	n/a	1.0e+04	3.3
S01M000332			Am-241 by TRU-SPEC Resin IonEx	uCi/Sample	108	<1.07e+04	1.20e+05	n/a	n/a	n/a	n/a	1.4e+04	1.9
S01M000332			Cm-243/244 by TRU-SPEC Resin	uCi/Sample	n/a	<1.07e+04	<1.43e+04	n/a	n/a	n/a	n/a	1.4e+04	1.0e+02

2nd Etch Pipe Interior: 2nd Etch Pipe Interior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000221			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	2.47e+04	n/a	n/a	n/a	n/a	2.6	0.76
S01M000221			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	2.22e+03	n/a	n/a	n/a	n/a	23	2.1

Attachment 2. Data Summary Report
233S SDG11

CUSTOMER SDG #: S0031
CUSTOMER SAMPLE ID: B124H1-A

SAMPLE PORTION: 1st Etch Pipe Exterior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000223			Np237 by TTA Extraction	uCi/Sample	87.4	<0.0902	<0.172	n/a	n/a	n/a	n/a	0.20	1.5e+02
S01M000223		D	Uranium-234 by ICP/MS Acid Add	ug/mL	n/a	<1.20e-05	<3.00	n/a	n/a	n/a	n/a	3.0	n/a
S01M000223		D	Uranium-235 by ICP/MS Acid Add	ug/Sample	91.8	<1.20e-05	37.7	n/a	n/a	n/a	98.7	3.0	n/a
S01M000223		D	Uranium-238 by ICP/MS Acid Add	ug/Sample	105	<1.20e-05	6.07e+03	n/a	n/a	n/a	88.1	3.0	n/a
S01M000223		D	Neptunium-237 by ICP/MS	ug/Sample	102	<5.00e-05	366	n/a	n/a	n/a	96.9	13	n/a
S01M000223		D	Plutonium-239 by ICP/MS	ug/Sample	102	<5.00e-05	1.38e+04	n/a	n/a	n/a	63.2	13	n/a
S01M000223		D	Plutonium-240 by ICP/MS	ug/Sample	n/a	<5.00e-05	1.52e+03	n/a	n/a	n/a	n/a	13	n/a
S01M000223		D	Pu/Am-241 by ICP/MS	ug/Sample	n/a	n/a	243	n/a	n/a	n/a	n/a	0.013	n/a
S01M000223			Cobalt-60 by GEA	uCi/Sample	109	<2.79e-05	<3.08e-05	n/a	n/a	n/a	n/a	3.1e-05	n/a
S01M000223			Cesium-137 by GEA	uCi/Sample	112	<3.33e-05	<5.01e-05	n/a	n/a	n/a	n/a	5.0e-05	n/a
S01M000223			Europium-152 by GEA	uCi/Sample	n/a	<5.75e-05	<5.89e-05	n/a	n/a	n/a	n/a	5.9e-05	n/a
S01M000223			Europium-154 by GEA	uCi/Sample	n/a	<8.65e-05	<8.54e-05	n/a	n/a	n/a	n/a	8.5e-05	n/a
S01M000223			Europium-155 by GEA	uCi/Sample	n/a	<4.38e-05	<5.13e-05	n/a	n/a	n/a	n/a	5.1e-05	n/a
S01M000223			Radium-226 by GEA	uCi/Sample	n/a	<5.49e-04	<5.69e-04	n/a	n/a	n/a	n/a	5.7e-04	n/a
S01M000223			Americium-241 by GEA	uCi/Sample	n/a	<3.88e-05	788	n/a	n/a	n/a	n/a	n/a	0.22
S01M000223			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	1.88e+03	n/a	n/a	n/a	n/a	0.10	0.54
S01M000223			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	164	n/a	n/a	n/a	n/a	0.85	1.5
S01M000334			Pu-239/240 by TRU-SPEC Resin	uCi/Sample	103	<5.52e+03	1.56e+03	n/a	n/a	n/a	n/a	1.3e+02	1.9
S01M000334			Pu-238 by TRU-SPEC Resin IonEx	uCi/Sample	n/a	<5.52e+03	390	n/a	n/a	n/a	n/a	1.3e+02	3.1
S01M000334			Am-241 by TRU-SPEC Resin IonEx	uCi/Sample	108	<1.07e+04	1.67e+03	n/a	n/a	n/a	n/a	1.9e+02	2.0
S01M000334			Cm-243/244 by TRU-SPEC Resin	uCi/Sample	n/a	<1.07e+04	<193	n/a	n/a	n/a	n/a	1.9e+02	1.0e+02

2nd Etch Pipe Exterior: 2nd Etch Pipe Exterior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000253			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	214	n/a	n/a	n/a	n/a	0.010	0.50
S01M000253			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	19.2	n/a	n/a	n/a	n/a	0.085	1.4

Paint: Paint

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000250			Aroclor-1016 by SW-846 8082	ug/Kg	n/a	<170	<270	n/a	n/a	n/a	n/a	2.7e+02	n/a
S01M000250			Aroclor-1221 by SW-846 8082	ug/Kg	n/a	<500	<795	n/a	n/a	n/a	n/a	7.9e+02	n/a
S01M000250			Aroclor-1232 by SW-846 8082	ug/Kg	n/a	<460	<731	n/a	n/a	n/a	n/a	7.3e+02	n/a
S01M000250			Aroclor-1242 by SW-846 8082	ug/Kg	n/a	<260	<431	n/a	n/a	n/a	n/a	4.3e+02	n/a
S01M000250			Aroclor-1248 by SW-846 8082	ug/Kg	n/a	<130	<207	n/a	n/a	n/a	n/a	2.1e+02	n/a
S01M000250			Aroclor-1254 by SW-846 8082	ug/Kg	134	<130	4.93e+03	n/a	n/a	n/a	n/a	2.1e+02	n/a
S01M000250			Aroclor-1260 by SW-846 8082	ug/Kg	n/a	<170	<270	n/a	n/a	n/a	n/a	2.7e+02	n/a
S01M000250			Aroclor-1262 by SW-846 8082	ug/Kg	n/a	<130	<207	n/a	n/a	n/a	n/a	2.1e+02	n/a

Paint - Fusion Digest: Paint - Fusion Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000252		F	Pu-239/240 by TRU-SPEC Resin	uCi/g	110	<14.7	404	n/a	n/a	n/a	n/a	33	1.9
S01M000252		F	Pu-238 by TRU-SPEC Resin IonEx	uCi/g	n/a	<14.7	125	n/a	n/a	n/a	n/a	33	87
S01M000252		F	Np237 by TTA Extraction	uCi/g	90.5	<0.0187	0.135	n/a	n/a	n/a	n/a	0.028	17
S01M000252		F	Uranium-234 by ICP/MS (Fusion)	ug/g	n/a	<0.120	<80.7	n/a	n/a	n/a	n/a	81	n/a
S01M000252		F	Uranium-235 by ICP/MS (Fusion)	ug/g	91.8	<0.120	<80.7	n/a	n/a	n/a	107	81	n/a
S01M000252		F	Uranium-238 by ICP/MS (Fusion)	ug/g	105	<0.120	4.93e+03	n/a	n/a	n/a	94.0	81	n/a
S01M000252		F	Neptunium-237 by ICP/MS-fusion	ug/g	102	<0.150	219	n/a	n/a	n/a	88.1	1.0e+02	n/a
S01M000252		F	Plutonium-239 by ICP/MS-fusion	ug/g	102	<0.150	4.31e+03	n/a	n/a	n/a	76.6	1.0e+02	n/a
S01M000252		F	Plutonium-240 by ICP/MS-fusion	ug/g	n/a	<0.150	554	n/a	n/a	n/a	n/a	1.0e+02	n/a
S01M000252		F	Pu/Am-241 by ICP/MS - fusion	ug/g	n/a	n/a	96.8	n/a	n/a	n/a	n/a	0.010	n/a
S01M000252		F	Cobalt-60 by GEA	uCi/g	101	<0.0138	<0.0121	n/a	n/a	n/a	n/a	0.012	n/a
S01M000252		F	Cesium-137 by GEA	uCi/g	110	<0.0287	<0.0288	n/a	n/a	n/a	n/a	0.029	n/a
S01M000252		F	Europium-152 by GEA	uCi/g	n/a	<0.0250	<0.0296	n/a	n/a	n/a	n/a	0.030	n/a
S01M000252		F	Europium-154 by GEA	uCi/g	n/a	<0.0353	<0.0402	n/a	n/a	n/a	n/a	0.040	n/a
S01M000252		F	Europium-155 by GEA	uCi/g	n/a	<0.0305	<0.0493	n/a	n/a	n/a	n/a	0.049	n/a
S01M000252		F	Radium-226 by GEA	uCi/g	n/a	<0.215	<0.226	n/a	n/a	n/a	n/a	0.23	n/a
S01M000252		F	Americium-241 by GEA	uCi/g	n/a	<0.0727	323	n/a	n/a	n/a	n/a	n/a	0.45
S01M000252		F	Am-241 by TRU-SPEC Resin IonEx	uCi/g	86.8	<30.3	348	n/a	n/a	n/a	n/a	54	3.2
S01M000252		F	Cm-243/244 by TRU-SPEC Resin	uCi/g	n/a	<30.3	<54.3	n/a	n/a	n/a	n/a	54	1.0e+02
S01M000252		F	Alpha Env: Solids/Miscs	uCi/g	92.6	<0.311	691	n/a	n/a	n/a	n/a	0.33	1.4
S01M000252		F	Beta in Env. Solids/Misc	uCi/g	105	<0.937	71.4	n/a	n/a	n/a	n/a	1.5	3.6

Attachment 2. Data Summary Report
233S SDG11

CUSTOMER SDG #: S0032
CUSTOMER SAMPLE ID: B124H2

SAMPLE PORTION: Acid Digest

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000218		A	Cobalt-60 by GEA	uCi/g	98.6	<5.02e-03	<4.79e-03	n/a	n/a	n/a	n/a	4.8e-03	n/a
S01M000218		A	Cesium-137 by GEA	uCi/g	98.0	<5.69e-03	<5.67e-03	n/a	n/a	n/a	n/a	5.7e-03	n/a
S01M000218		A	Europium-152 by GEA	uCi/g	n/a	<0.0106	<0.0112	n/a	n/a	n/a	n/a	0.011	n/a
S01M000218		A	Europium-154 by GEA	uCi/g	n/a	<0.0161	<0.0161	n/a	n/a	n/a	n/a	0.016	n/a
S01M000218		A	Europium-155 by GEA	uCi/g	n/a	<7.65e-03	<0.0134	n/a	n/a	n/a	n/a	0.013	n/a
S01M000218		A	Radium-226 by GEA	uCi/g	n/a	<0.101	<0.104	n/a	n/a	n/a	n/a	0.10	n/a
S01M000218		A	Americium-241 by GEA	uCi/g	n/a	<6.94e-03	47.0	n/a	n/a	n/a	n/a	n/a	0.25
S01M000218		A	Alpha Env: Solids/Miscs	uCi/g	91.4	3.02e-03	135	n/a	n/a	n/a	n/a	7.0e-03	0.53
S01M000218		A	Beta in Env. Solids/Misc	uCi/g	104	<0.0232	13.7	n/a	n/a	n/a	n/a	4.3e-03	1.3

Parent: Parent

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000217			Volume % Settled Solids	%	n/a	n/a	100	n/a	n/a	n/a	n/a	0.10	n/a
S01M000217			Color of Sample		n/a	n/a	brown	n/a	n/a	n/a	n/a	n/a	n/a
S01M000217			Organic Vol Present/sampleprep	mL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

FH-0105384

ATTACHMENT 3

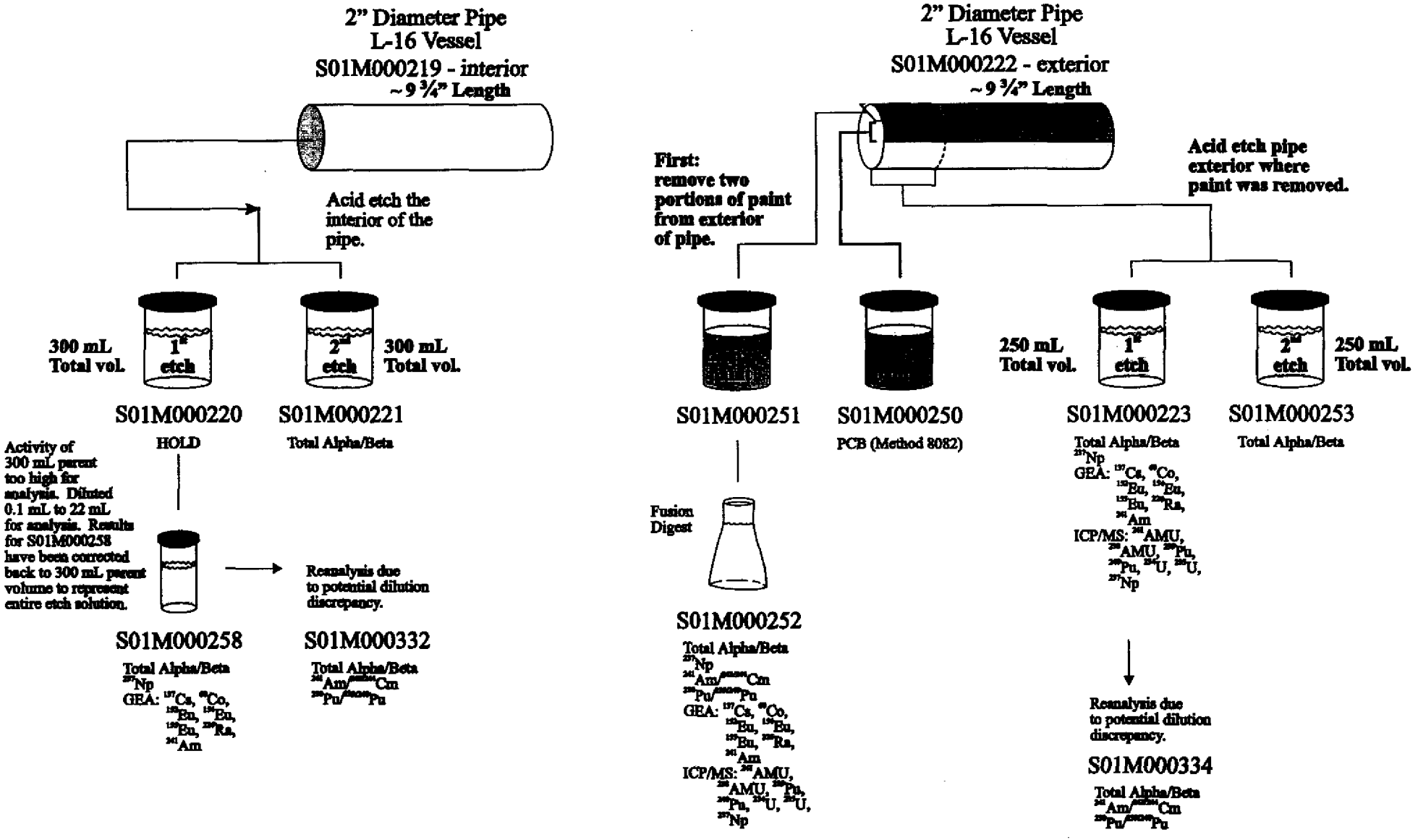
233S Pu CONCENTRATION FACILITY SAMPLES

Consisting of 3 pages
Including cover page

233-S Pu Concentration Facility Samples

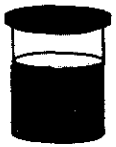
SDG S0031

L-16 Vessel Pipe
B124H1 - interior material
B124H1-A - exterior material



233-S Pu Concentration Facility Samples

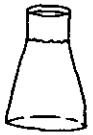
SDG S-0032
L-6 Vessel Solid
B124H2



S01M000217

Appearance

Acid Digest



S01M000218

Total Alpha
Total Beta
GEA: Am-241, Co-60, Cs-137, Eu-152, Eu-154, Eu-155, Ra-226

FH-0105384

ATTACHMENT 4

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Consisting of 4 pages
Including cover page

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B99-024-40	Page 1 of 1
Collector R. Thoren	Company Contact: Steve Trent	Telephone No.: 372-9651	Project Coordinator: TRENT, SJ	Price Code: 9L
Project Designation: 233-S Plutonium Concentration Facility Process Areas - Oth	Sampling Location: 233-S		SAF No.: B99-024	Air Quality ☐
Ice Chest No.: 4H2V-S/N 03-98/010026	Field Logbook No.: NA	COA: R233572800	Method of Shipment: HAND CARRY	Data Turnaround: 60 Days
Shipped To: 222-S Lab Operations	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

60 mR/hr on contact, 6 mR/hr at 30 cm. Interior of pipe contains 16 million dpm smearable alpha, exterior of pipe has >18 million dpm alpha direct. Approximate 2 grams of Pu.

Special Handling and/or Storage

Preservation	None	None	None	None	None	None				
Type of Container	~~None~~ PIPE	~~None~~ PIPE	~~None~~ PIPE	~~None~~ PIPE	~~None~~ PIPE	~~None~~ PIPE	RT 5-24-01			
No. of Container(s)	0	0	0	0	0	0				
Volume	60g	60g	60g	60g	60g	60g				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Gross Alpha; Gross Beta	See item (2) in Special Instructions.	Isotopic Plutonium	Neptunium-237	Americium-241/Curium-244				
Sample No.	Matrix *	Sample Date	Sample Time							
B124H1	OTHER SOLID	5.30.01	0900		X	X	X	X	X	(Interior PIPE)
B124H1-A	OtherSolid	5.30.01	0900	X	X	X	X	X	X	(Exterior PIPE)

CHAIN OF POSSESSION	Sign/Print Names			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
R. Thoren	5/30/01 0940	RDMcLFS	5/30/01 0940	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	

SPECIAL INSTRUCTIONS

Sample is 2"by 8" long section of pipe. Extract contamination from inside of pipe and report as sample B124H1. Extract contamination from exterior of pipe and report as sample B124H1-A. Contact Joan Kessner or Steve Trent for priority order of analysis

(1) Actinides ICPMS {Americium-241, Plutonium-238, Plutonium-239/240, Uranium-234, Uranium-235}, Plutonium-241, Neptunium-237 7th

(2) Gamma Spectroscopy {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

Prior to Analysis

Contact Steve Trent for specific sample preparation, analysis instructions

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B99-024-39	Page 1 of 1
Collector: R. Thoren	Company Contact: Steve Trent	Telephone No.: 372-9651	Project Coordinator: TRENT, SJ	Price Code: 9L; Data Turnaround: 60 Days
Project Designation: 233-S Plutonium Concentration Facility Process Areas - Oth	Sampling Location: 233-S		SAF No.: B99-024	Air Quality ☐
Ice Chest No.: 4H2V-SIN 03-95/010026	Field Logbook No.: NA	COA: R233SP2800	Method of Shipment: HAND CARRY	
Shipped To: 222-S Lab Operations	Offsite Property No.: N/A		Bill of Lading/Air Bill No.: N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

16-18 Million dpm alpha on contact. 15 mR/hr on contact.
Determined to be TRU, but does not contain gram quantities of Pu

Special Handling and/or Storage

Preservation	None	None									
Type of Container	Snap Vial	Snap Vial									
No. of Container(s)	0	1									
Volume	60mL	60mL									
SAMPLE ANALYSIS	Gross Alpha; Gross Beta	See item (1) in Special Instructions.									
Sample No.	Matrix *	Sample Date	Sample Time								
B124H2	OTHER SOLID	5.30.01	0900	X	X						

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From: R. Thoren	Date/Time: 0940 5/30/01	Received By/Stored In: Gamma ROMero	Date/Time: 0946 5/30/01
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

Perform all requested analysis from 1- 60 ml snap lid container. When analysis is complete, and final data is reviewed, The ERC may request additional isotopic and or chemical analysis

(1) Gamma Spectroscopy {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title		Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method		Disposed By	Date/Time

BHI-EE-011 (10/99)

REQUEST FOR SAMPLE ANALYSIS (RSA)

Group ID No. (For lab use only)

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. CACN/COA	7. Cost Center
233-S Facility (BHI)	5.30.01	S J TRENT	RL233SP2900	8D400

Customer/Project Code	3. Submitted By	5. Requestor's Phone/MSIN/FAX
	R T	372-9651/H9-03/372-9487

8. Customer ID No.	9. Laboratory Sample No.	10. Volume of Sample	11. Matrix of Sample	12. Requested Analyses	13. Expected Range
B124H1/B124H1-A		8" pipe	solid	see chain of custody & (1), (3)	~2.0g Pu
B124H2		50mL	solid	see chain of custody	< 0.01g Pu
				(3) call Steve Trent or Joan Kessner to discuss sample prep process for pipe leaching.	

14. Does sample have a MSDS?

○ Yes HEHF assigned MSDS No. _____

◉ No Description of process that produced waste/sample:

Pipe scale & pipe section from process vessel system

(1) Interior and exterior of pipe to be analysed as two distinct and separate samples. Interior of pipe corresponds to sample # B124H1 and exterior of pipe corresponds to sample # B124H1-A.

Will radiochemistry results be used for unconditional release? ○ Yes ◉ No

15. Is this sample RCRA listed? ○ Yes ◉ No

Applicable Listed Waste Codes:

○ Yes ○ No P Codes: (list) _____
○ Yes ○ No U Codes: (list) _____
○ Yes ○ No K Codes: (list) _____
○ Yes ○ No F Codes: (list) _____

Applicable Characteristic Codes:

○ Yes ○ No D001: (how determined) _____ Ignitable
○ Yes ○ No D002: (how determined) _____ Corrosive
○ Yes ○ No D003: (how determined) _____ Reactive
○ Yes ○ No Toxic: (list codes) _____

PCB: Does this waste/sample contain PCBs?

☐ Yes Over 500 ppm
☐ Yes Over 50 ppm
☑ Yes PCBs are suspected (2)
☑ No PCBs are suspected

If YES, what is the source of the PCBs?

☐ Transformer, capacitor, or ballast
☐ Other, specify _____
☑ Unknown

16. Sample Disposition

☐ Return to Customer
☐ Samples found to contain PCBs will be returned to the customer
☐ Dispose of per facility procedures with applied charges for analyses and disposal

SEC 5/30/01

Sample(s) Dose Rate at Contact: [illegible] 40 mrem/hr < .5 mrem/hr cont.

HPT Signature: [signature]

17. QC Required ☐ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016) LOI for the 233-S Plutonium Concentration Facility Sample Analysis

☑ Other (list reference document or attach)

18. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)

(2) Exterior of pipe (B124H1-A) is considered PCB-suspect. All other samples, including interior of pipe are not PCB-suspect.

19. Requested Turnaround Time

☐ 2 Weeks ☐ 4 Weeks
☑ Other 45 days interim 60 days final

20. Sample Received By: [signature] Date 5/30/01 Time 0940

21. Chain of Custody

○ No ◉ Yes
Number: _____

FH-0105384

ATTACHMENT 5

ADDITION OF PCB ANALYSIS TO SAMPLE B124H1-A

Consisting of 3 pages
Including cover page

Esch, Ruth A

From: Trent, Stephen J
Sent: Monday, June 18, 2001 7:22 AM
To: Powell, Katherine L; Esch, Ruth A
Cc: Ayres, Doris E
Subject: Addition of PCB analysis to sample B124H1-A

Importance: High

Ruth and Kathy:

Apparently the PCB analysis for smaple B124H1-A was inadvertently left off the COC. Please add this analysis to the analytical request for this sample.

Thanks.

Steve Trent
ERC Sample Management
372-9651

Bushaw, Ruth A

From: Trent, Stephen J
Sent: Thursday, August 09, 2001 7:33 AM
To: Bushaw, Ruth A; Powell, Katherine L
Cc: Prilucik, John R
Subject: PCBs on 233-S pipe sample

Ruth and Kathy:

I spoke w/ Dave Encke of the 233-S project regarding the distribution of PCBs on the exterior of the pipe sample. He indicated that any PCBs found on the exterior of the pipe would be associated with the paint/fixative.

Hopefully this answers the PCB questions that Kathy asked in last Wednesday's lab status meeting.

Regards,

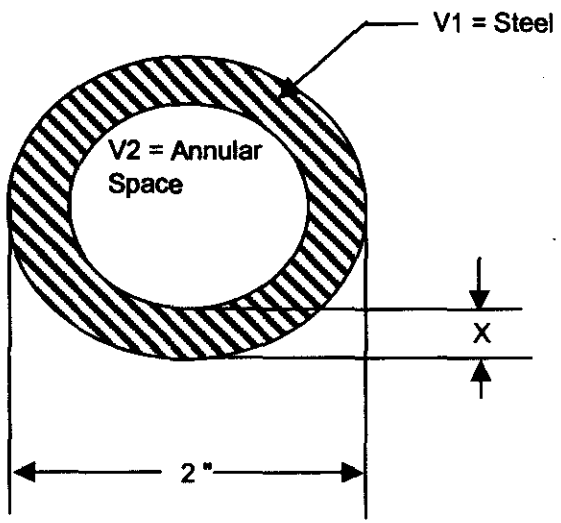
Steve

FH-0105384

ATTACHMENT 6

ACTUAL MEASUREMENTS

Consisting of 2 pages
Including cover page



Actual Measurements:			inch	cm
		OD	2.52	6.4008
		ID	1.97	5.0038
		Wall	0.275	0.6985
		Length	9.75	24.765

Volume of Material = V1 - V2

	inch^3	cm^3
V1:	48.62903	796.887
V2:	29.7185	486.999
V1 - V2 =	18.91052	309.8879

Material	**Densities (g/cm^3)**
304 / 304L	7.94
309	7.98
316 / 316L	7.98
347	8.03
410	7.70

Estimated Pipe Densities		
	grams	**lbs**
304 / 304L	2460.51	5.424525
309	2472.906	5.451852
316 / 316L	2472.906	5.451852
347	2488.4	5.486012
410	2386.137	5.260559

FH-0105384

ATTACHMENT 7

TEST PROCEDURE ANALYSIS OF INSIDE AND OUTSIDE WALL OF TRANSFER PIPE

Consisting of 6 pages
Including cover page

TEST PROCEDURE

ANALYSIS OF INSIDE AND OUTSIDE WALL OF TRANSFER PIPE

Approval Designator: ES

Linda E Borneman — 6/21/01

L. E. Borneman
222-S Laboratory ECO
Fluor Hanford, Inc.

Date

Ruth A Bushaw — 6/21/01

R. A. Bushaw
222-S Laboratory Project Coordinator
Fluor Hanford, Inc

Date

Ruth A Bushaw for R.L. Weiss per email. — 6/25/01

R. L. Weiss
Chemist, Sample and Data Management
CH2 Hanford, Inc.

Date

[signature] — 6/21/01

L. L. Lockrem
Manager, TPM
Numatec

Date

D. L. Kelly — 6/21/01

D. L. Kelly
Industrial Safety
Fluor Hanford, Inc.

Date

TEST PROCEDURE

ANALYSIS OF INSIDE AND OUTSIDE WALL OF TRANSFER PIPE

INTRODUCTION

Analytical Services has been requested by 233S Project Personnel to perform an analysis of a section of transfer pipe. The transfer pipe is from the L-16 vessel located at the 233-S facility, in the 200 West Area.

The section of pipe delivered to Analytical Services is approximately 8 inches in length and 2 inches outside diameter and appears to be composed of stainless steel. The outside of the pipe was painted with a Polymeric Barrier System (PBS), composed of modified acrylic latex. The pipe was used for radionuclide transfer during its service life.

Due to the high level of alpha contamination on the outside of the pipe, sample preparation steps will be performed inside of the glovebox in 222-S room 1C.

It is not anticipated that waste streams will be generated from this analysis, as any volume of aqueous or organic liquids will be consumed during subsequent analysis. The tests will be directed to both the internal and external portions of the pipe. Acid etching will be performed on the internal surface of the pipe for total alpha, total beta, GEA, isotopic Pu, Np, and Am analysis. The PBS will be removed and analyzed for polychlorinated biphenyls and radionuclides. The exterior of the pipe will be leached and analyzed for surface radiation contamination. Analysis will be performed in accordance with the referenced LOI and chain of custody form.

MATERIALS

1. Eluting solution (1000 mL): aqueous solution of 25% conc. HCL + 25% conc. HNO_3.
2. Organic solvent: hexane.
3. Sharpened putty knife/paint scrapper.
4. Stoppers.
5. 250 mL graduated cylinder.
6. Four 500 mL acid resistant transfer bottles.
7. Glass container with lid for hexane soak.
8. Transfer container for hexane/PBS.
9. MSDSs for items 1 and 2.

PROCEDURE

Acid Etch for Pipe Internal Surface Area

1. Stopper one end and secure in upright position with stopper at the bottom.
2. Add 250 mL of aqueous 25% conc. HCL + 25% conc. HNO_3 solution.
3. Wait an appropriate amount of time to allow the acid to degas.
4. Stopper open end.
5. Let stand for 10 minutes.
6. Invert after 10 minutes.
7. Repeat steps 5 and 6 four times for a total exposure to the acid for 40 minutes.
8. Decant into the first 500 mL transfer bottle.
9. For second acid etch, repeat steps 3 to 7.
10. Decant into a second 500 mL transfer bottle.
11. Submit the acid etch samples for radiological analysis. All etching solutions collected after the first etching will only be analyzed for total alpha/total beta to confirm that the removable radionuclide levels were reduced.

If the radiological analysis indicates that the amount of radionuclides in the second etching is ≤ 10% of the total amount of radionuclides removed, then no further etching will be required. That is, if

$$[C_s / (C_i + C_s)] \times 100 \leq 10\%$$

Where C_i = concentration in μCi from the first acid wash;
C_s = concentration in μCi from the second acid wash

If the radiological analysis indicates that the second wash still contains more than 10% of the total amount radionuclides removed, further etching will be performed. Repeat steps 2 through 10 for a third and fourth acid etch.

Polymeric Barrier System (PBS)

Estimate the surface area covered by the PBS before the procedure commences.

1. Score a section of the PBS and peel the coating off of the pipe.
2. Weigh and submit the peeled coating for PCB and radiological analysis.

Acid Etch of Pipe External Surface Area

1. Measure the area exposed by scraping of the PBS from the pipe.
2. Using the etching solution described previously, acid etch the exterior surface in two increments, exposing the surface to the acid for 40 minutes each time.
3. Collect and measure each incremental acid etch.
4. Submit the acid samples for radiological analysis.

If the radiological analysis indicates that the amount of radionuclides in the second etching is ≤ 10% of the total amount of radionuclides removed, then no further etching will be required. That is, if

$$[C_s / (C_i + C_s)] \times 100 \leq 10\%$$

Where C_i = concentration in μCi from the first acid wash;
C_s = concentration in μCi from the second acid wash

If the radiological analysis indicates that the second wash still contains more than 10% of the total amount radionuclides removed, further etching will be performed. Repeat steps 2 through 4 for a third and fourth acid etch.

Alternative Approach to Removing the PBS Layer

1. Decant the appropriate volume of hexane into a glass container.
2. Submerse the pipe fully in the hexane and place the lid on the container.
3. Soak the pipe overnight in the hexane.
4. Inspect the surface of the pipe.
5. If the PBS has been removed, then submit the hexane for polychlorinated biphenyl analysis (PCB).
6. After the PBS coating has been removed, then the outside surface of the pipe will be acid etched (above) and analyzed for total alpha, total beta, GEA, Pu, Np and Am.
7. If this approach does not remove the PBS coating, further instructions will need to be provided in a revision to this test procedure.
8. If this, or another solvent removal, approach is required for removal of the PBS coating, further instructions for providing a sample of the solvent for radionuclide analysis might need to be provided in a revision to this test procedure.

DATA REPORTING

Data will be reported as μCi/sample or micrograms/sample for the radionuclide analyses of the acid etch solutions. The entire internal surface of the pipe will be etched for analysis. The percentage of external pipe area etched will be provided. The volume of the individual etching solutions submitted for analysis will also be provided.

The results for the PCB and radionuclide analyses of the PBS layer will be reported as μCi/g of PBS or μg/g of PBS. The percentage of the area of PBS removed will be provided.

Although the pipe was submitted with a weight, as a confirmatory step, a careful measurement of the pipe will be carried out. The volume of the entire pipe will be calculated and multiplied by the density of the pipe material to obtain a calculated weight of the pipe. The dimensions and calculated weight of the pipe will be reported.

SAFETY

MSDS documentation is available for all reagents in the execution of this test procedure. None of the reagents used or procedures to be performed pose threats beyond those generally encountered in the routine chemical analysis of materials in the 222-S Laboratories.

WASTES

It is not anticipated that wastes will be generated during this procedure. Liquid materials will be loaded out and sent for analysis. The pipe will be returned to the originating organization.

REFERENCE:

Letter, A.S. Chaloupka, BHI to E.F. Mares, FDH, "Letter of Instruction for the 233S Plutonium Concentration Facility Sample Analysis", 084911, dated December 20, 2000.

ORIGINAL Dayes

SDR # B02-010
Revision #: 0
Date Initiated: 10/8/01

SAMPLE DISPOSITION RECORD

SAF: B99-024
OU: N/A
Project ID: 233-S Facility
Task ID: 2
Sampling Event: 233-S Plutonium Concentration Facility Process

Laboratory: 222-S Lab Operations

Task Manager: A. B. Chaloupka

Sampling Information:
Number of Samples: 4
ID Numbers: B11Y22, B124H1, B124H2, B124H1-A
Matrix: Other Solid
Collection Date: 5/2/01 – 5/30/01

Issue Background:

Class: ☒ Project Data Use ☐ General Laboratory Direction ☐ Validation Direction ☐ Sample Management Direction

Type: Other

Description: Incorrect Dilution Used in Radiochemistry Analyses

Disposition:

Description: The laboratory reported that they discovered a quality problem with a dilution method used in radiochemistry analyses conducted from May 2001 through August 2001. The dilution error can result in laboratory results that are bias high by 0% to 20% for some samples. This problem impacts samples that were diluted 1:10 prior to analysis. Other dilutions ratios were not affected. The following analyses may have been impacted by the dilution error:

B11Y22 – Isotopic Pu and Am-241 by AEA
B124H1 – Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta
B124H1-A - Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta
B124H2 – Gross Alpha/Beta

ERC Sample Management has requested that these analyses be rerun (see SDR B02-011).

Justification: Documentation of the dilution problem is needed to support the request for the analysis reruns on the listed samples. The 233-S D&D project will evaluate the impact of any changes to the data following receipt of the rerun results.

Approval Signatures:

S. J. Trent — 10/17/01
Project Coordinator (Print/Sign Name) — Date

A. B. Chaloupka — 10/22/01
Task Manager (Print/Sign Name) — Date

ORIGINAL
Dayes

SDR # B02-011
Revision #: 0
Date Initiated: 10/8/01

SAMPLE DISPOSITION RECORD

SAF: B99-024
OU: N/A
Project ID: 233-S Facility
Task ID: 2
Sampling Event: 233-S Plutonium Concentration Facility Process

Laboratory: 222-S Lab Operations

Task Manager: A. B. Chaloupka

Sampling Information:
Number of Samples: 4
ID Numbers: B11Y22, B124H1, B124H2, B124H1-A
Matrix: Other Solid
Collection Date: 5/2/01 – 5/30/01

Issue Background:

Class: ☐ Project Data Use ☒ General Laboratory Direction ☐ Validation Direction ☐ Sample Management Direction

Type: Sample Reanalysis

Description: Samples Reanalyzed Due to Dilution Error

Disposition:

Description: The laboratory reported that they discovered a quality problem with a dilution method used in radiochemistry analyses (see SDR B02-010). ERC Sample Management has requested that the following impacted sample analyses be rerun:

B11Y22 – Isotopic Pu and Am-241 by AEA
B124H1 – Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta
B124H1-A - Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta
B124H2 – Gross Alpha/Beta

Justification: Because the actual impact of the dilution error cannot be quantified, sample reanalysis is to be performed.

Approval Signatures:

S. J. Trent — 10/17/01
Project Coordinator (Print/Sign Name) — Date

A. B. Chaloupka — 10/22/01
Task Manager (Print/Sign Name) — Date